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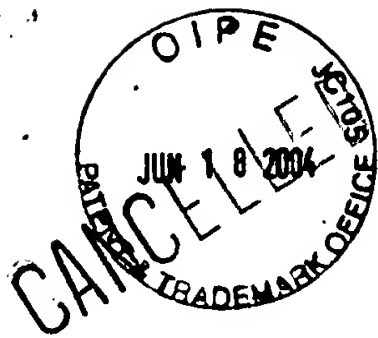
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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Application of: **KAZUYUKI NAKATA**

CASE NO: AD-6705

APPLICATION NO.: 09/890,028

GROUP ART UNIT: 1714

FILED: JULY 24, 2001

EXAMINER: NILAND, PATRICK DENNIS

**FOR: AQUEOUS DISPERSION COMPOSITION AND MANUFACTURING
METHOD FOR THE COMPOSITION**

APPELLANT'S REPLY TO EXAMINER'S ANSWER

Commissioner for Patents

P. O. Box 1450

Arlington, VA 22313-1450

Sir:

In response to the Examiner's Answer, it now appears that all arguments in support of the §103 rejection of all claims are predicated on the misapplication of what is described repeatedly as HLB (hydrophile-lipophile balance). It is respectfully submitted that one of routine skill in the art knows that the concept of HLB is highly suspect and not universally applicable, usually finding credence only in surfactant chemistry dealing with oil and water emulsions. Attached are photocopies of from BAILEY'S INDUSTRIAL OIL AND FAT PRODUCTS. Volume I, Fourth Edition (1979), JOHN WILEY & SONS establishing the nature of HLB.

It is respectfully submitted that page 596 of the above identified publication (herein attached) serves as evidence to the arbitrary nature of the HLB scale that (at best) relates the "emulsifying efficiency of a surfactant" to the "relative contributions of the polar hydrophilic head and the nonpolar lipophilic

tail" of the surfactant molecule. Please note that the present invention does not involve oil and water emulsification nor a molecule that has both a polar hydrophilic head and the nonpolar lipophilic tail. In fact, no surfactant molecule is needed and preferably not used as expressly stated at page 2, lines 31-32 of the specification. Of the three components involved in the claims, only the ethylene-methacrylic acid copolymer seems to be of concern in the rationalization associated with HLB. However, as a random copolymer of ethylene and methacrylic acid no polar hydrophilic head and the nonpolar lipophilic tail is present even after neutralization and hence no surfactant results. Consequently the HLB concept is scientifically inappropriate and inapplicable. Furthermore, as an issue of law, chemistry is unpredictable. In this case, the ethylene and methacrylic acid copolymer is known to form ionomer after neutralization of pendant carboxyl groups. Ionomer, in turn, is a thermolable polymeric material that is known to be thermoplastic above the melting point but thermoset below the melting point because of ionic clusters bridging (i.e., crosslinking) between adjacent macromolecules. It is far more reasonable to assume that this type of chemical bonding is present in the instant compositions when considering the identity of the individual components and the apparent lack of surfactant type micellar potential formation in solution. Yet the instant invention demonstrates that in the presence of excess ammonia aqueous dispersions of ethylene and methacrylic acid copolymer do not experience viscosity rise or aggregation. In view of the above it is submitted that this §103 rejection is a classical example of hindsight prompted by Appellant's disclosure and rationalized on inappropriate scientific principles.

In view of the nature of the present rejection Appellant's attorney requests the use of a DuPont expert witness at the oral hearing. If this request requires a petition for suspension of rules formal notice before the hearing would be appreciated.

It is also noted that three signatures (Primary Examiner and two Conferees) appear on the EXAMINER'S ANSWER dated April 20, 2004, and as such an invitation to each to attend the oral hearing is herein respectfully extended.

With respect to the propriety of combining the teachings of Best and Nothnagel the Examiner's Answer asserts incorrectly that the instant claims do not exclude organic solvent as it is not shown to materially affect the basic and novel characteristics of the compositions. At page 2, lines 35-37, the phrase "consisting essentially of" is defined (in part) for purposes of this invention to mean smaller amounts of other components. Clearly the concept in the Nothnagel reference of having an organic solvent as the exclusive solvent initially that is then replaced with water through a distillation process is not a smaller amount of another component.

With respect to the Examiner's observation that the Summary of Invention portion of the submitted brief is deficient because the claims do not require shelf life of a year or more, the claims contain the range of ammonia (i.e., 110-150% relative to neutralization of the carboxyl groups). At the top of page four of the specification Appellant teaches that a stable aqueous dispersion composition of the present invention containing a lower amount of ammonia cannot be obtained. The next sentence states that at amounts above this range gelling easily occurs. At lines 18-20 of the same page 4, aqueous dispersion within the range claimed is described as having good stability and good shelf life, such that neither the particle size nor the viscosity is significantly changed over times of up to a year or more. In view of this disclosure, the claims as presently

written explicitly cover aqueous dispersion compositions having improved shelf life.

In the Examiner's Answer at page 5, lines 4-5, the examiner takes the position that he does not concede that the dispersion of Best are not stable. It is interesting to note that the examiner equally cannot affirmatively assert that the dispersions in the Best reference have a shelf life of up to one year or more, for the Best reference totally ignores stability and uniformity of the dispersions over extended periods of time. However, it is certain that the Best reference does teach the use of high shear and aqueous alkalinity to achieve what is referred to as chemical comminuting the polymer to provide dispersed copolymer in neutralized form (see abstract). Consistent with Appellant's position above relative to HLB, at page 2, line 10 and following, Best acknowledges (at least implicitly) that his chemical comminuting is performed "In order to dissociate the ionic clusters and bring the EAA Polymer into solution ...". In other words, to disrupt the ionic cluster crosslinking between macromolecules and thus reduce particle size in the presence of an aqueous solvent. It respectfully submitted that the shelf life problem is the reverse of this and is monitored by the onset of particle size increase and a viscosity increase. The point of novelty associated with the instant invention is affirmative identified and set out in the claim language as using "ammonia in an amount required to neutralizing 110 to 150% of the carboxyl groups". Within this concentration window, the use of high shear is negated and the dispersion created is stable and uniform over extended periods of time. Below this window the uniform stable dispersion is not achieved (witness set of examples in the present application). Above this window gelling easily occurs. The Best reference does not recognize this window of opportunity. The Nothnagel reference does supply the necessary teaching deficient in the Best reference and as such no *prima facie* showing of obviousness is being made.

Respectfully submitted,



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Dated: June 16, 2004

BAILEY'S INDUSTRIAL OIL AND FAT PRODUCTS

*Volume 1
Fourth Edition*

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not necessarily the case: there may be a tendency for the emulsion to break or to invert from one type to another, if an attempt is made to increase the relative volume of the dispersed phase beyond a certain point. In many important emulsions, however, for example, in mayonnaise, the volume of the dispersed phase greatly exceeds that of the continuous phase. It is readily possible to prepare stable emulsions in which the volume of the inner phase exceeds that obtaining in spherical close packing, and in which the globules of this phase are consequently deformed, if an emulsifying agent is used which markedly resists coalescence of globules. The question of which liquid shall be dispersed is determined by surface tension considerations that are related to the nature of the emulsifying agent.

The most commonly accepted theory relating to emulsion type was deduced by Bancroft (23) and has been confirmed by the work of Clowes and others (24). According to this theory, the film of oriented surface-active molecules between the two phases of the emulsion is conceived to be in effect a third phase, possessing separate surface tensions against each of the two liquids forming an emulsion. In a water-oil emulsion, if the film has a greater affinity for water than for oil, its surface tension will be lower on the water than on the oil side. The film surface will then tend to curve in such a direction as to reduce the total surface tension; that is, it will form a curve with the area of low surface tension on the outside and that of high surface tension on the inside, or will tend to enclose globules of oil in water. If the film has a greater affinity for oil than for water, the effect will be reversed, and the tendency will be to form an emulsion of water in oil.

In general, surface-active agents that are freely soluble in water but sparingly soluble in oil will form emulsions of the oil-in-water type, whereas those more soluble in oil than in water will form emulsions of the water-in-oil type. Thus sodium and potassium soaps stabilize oil-in-water emulsions; calcium or magnesium soaps stabilize emulsions of the opposite type.

The emulsifying efficiency of a surfactant is related to the polarity of the molecule, which depends on the relative contributions of the polar hydrophilic head and the nonpolar lipophilic tail of the molecule. Griffin (25, 26) defined this relative polarity in terms of an empirical quantity, the HLB (hydrophile-lipophile balance) for a series of nonionic surfactants. This is an arbitrary scale where the most lipophilic substances have a low HLB, whereas the most hydrophilic substances have a high HLB.

Griffin (26) has used this principle to characterize the applicability of particular surfactants, as shown in Table 9.1.

The influence of the emulsifying agent on the emulsion type is not absolute. In some cases, it is possible to produce one type of emulsion by one method of mixing and a reverse type by a different mixing procedure. In other cases, as for example in the preparation of a cake dough, the emulsion may invert

d-Zelinsky brominations, 116,
 catalyzed oxygen uptake method,
 acidity, 156
 oil, 33
 characteristics, 435
 acid composition, 435
 oleic (margaric) acid, 21
 oleic acid, 28
 oxide, from castor oil, 163, 287,
 phenol, in flavor reversion, 158
 and fats, 141
 heptenal, in rancid fats, 141
 oil, 28, 36, 37
 characteristics, 448
 acid composition, 450
 carbons, 450
 oxides, 450
 iodine number, 116
 3,15,16-Hexabromostearic acid,
 5
 propylene, in soap, 570
 oleic acid, 22
 octatrienoic acid, 30
 Hexadecatrienoic acid, 30
 oleic acid, 28
 oleic (palmitoleic) acid, 28
 pressure liquid chromatography
 (PLC), 292
 oleic acid, 30
 milk fat, 310
 oil, fatty acid composition, 437
 oleic acid, 34, 437
 oxides, 437
 rease, 341
 aints, 769
 92
 arpic acid, 42
 ne, reduction of double bonds, 113
 "Analyzer," 113
 carbons, 67
 seed oil, 362
 g oil, 450
 ormylation, fatty acids, 127
 ormylation-oxidation, 134
 enated fats, safety, 260
 enation, 113
 xyl group, 105, 106
 tic, 106, 113

double bond isomerization in, 260
 selective, 106
 Hydrogen cyanide, addition to olefins, 120
 Hydrogen number, 113
 Hydrogen peroxide, in hydroxylation, 132
 Hydrogen sulfide, addition to double bonds,
 124
 Hydrolysis, fats, 100
 Hydroperoxides, by autoxidation, 702
 conjugated isomers, 139
 Hydrophile-lipophile balance, 596
 Hydroxy acid oils, 287, 453-456
 Hydroxy acids, 38
 methodology, 39
 18-Hydroxyoleostearic acid, 39
 Hydroxylation, fatty acids, 131
 Hydroxyl group, reactions, 162
 Hydroxyl number, 162
 4-Hydroxymethyl-2,6-*tert*-butylphenol,
 antioxidants, 258
 (+)-6-Hydroxy-6-methyl-9-oxooctacosanoic
 acid, 42
 4-Hydroxynonanoic acid, 79
 D-(+)-9-Hydroxy-10,12-octadecadienoic
 acid, 39
 18-Hydroxy-9,11,13-octadecatrienoic acid,
 39
 9-Hydroxy-12-octadecenoic acid, 39
 12-Hydroxy-9-octadecenoic acid, 39
 4-Hydroxyoctanoic acid, 79
 Hypohalogenation, 119
 Igepons, 627
 Illipé butter, 327, 328
 characteristics, 328
 composition, 329
 Imidazolines, quaternized, 644
 Induction period, in rancidity, 144
 Infrared spectroscopy, for determining
 functional groups, 225
 fats and oils, 224
 Inhibitors, 72
 Inhibitors, of oxidation, 149
 Inks, 776
 bond, 780
 bookbinders, 780
 cylinder press, 780
 embossing, 781
 flexographic, 781
 job printing, 780

lithographic, 781
 news, 780
 plate, 781
 printing, 776
 rotogravure, 781
 Inositol phosphatides, 47
 Interesterification, 747
 directed, 161
 fats, 101
 Interfacial tension, 184, 185, 591
 effect of monoglycerides, 186
 Iodine number, 114
 fatty acids, 115
 Hanus, 115
 triglycerides, 115
 Ironweed oil, 456
 Isanic acid, 40
 in isano oil, 459
 Isanolic acid, in isano oil, 459
 Isano oil, 40
 fatty acid composition, 459
 D-Isoascorbyl palmitate, as antioxidant, 155
 Isolinoic acid, 260
 in oil reversion, 156
 Isomerization, *cis-trans*, 44, 159, 225
 by bases, 160
 catalysts, 159
 geometric, 159
 position, 159
 unsaturated fatty acids, 159
 Isomerized oils (conjugated), 741
trans-Isomers, determination by infrared
 spectroscopy, 225
 Isomycomycin, structure by infrared, 225
 Isooleic acids, 44, 260
 Isovaleric acid, 17, 38
 Java olive oils, 459
 Jojoba wax, 29
 Kamlolenic acid, 39
 Kapok oil, characteristics, 407
 cyclopropenoid acids, 406
 fatty acid composition, 407
 unsaponifiables, 407
 Kauri-butanol (KB) value, 763
 Keto acids, 42
 9(10), 10(9)-Ketohydroxystearic acids, 132
 9-Keto-*trans*-10,*trans*-12-octadecadienoic
 acid, 42